

What is claimed is:

- 1 1. An apparatus comprising:
2 a thermal management device;
3 a heat source; and
4 an interface disposed between the thermal management device and the heat
5 source, the interface having a plurality of nanostructures.
- 1 2. The apparatus of claim 1, wherein the thermal management device comprises a
2 passive cooling device.
- 1 3. The apparatus of claim 2, wherein the passive cooling device comprises at least
2 one of a heat sink, a heat spreader, heat pipes, and a heat slug.
- 1 4. The apparatus of claim 1, wherein the thermal management device comprises an
2 active cooling device.
- 1 5. The apparatus of claim 4, wherein the active cooling device comprises at least
2 one of an air jet impingement device and a dielectric liquid device.
- 1 6. The apparatus of claim 1, wherein the heat source comprises an integrated
2 circuit (IC) die.

1 7. The apparatus of claim 1, wherein the interface comprises a plurality of
2 nanostructures formed on the thermal management device.

1 8. The apparatus of claim 1, wherein the interface comprises a plurality of
2 nanostructures formed on the heat source.

1 9. The apparatus of claim 1, wherein the interface comprises a plurality of
2 nanostructures formed on the thermal management device and the heat source, the
3 plurality of nanostructures formed on the thermal management device being coupled to
4 the plurality of nanostructures formed on the heat source.

1 10. The apparatus of claim 9, wherein the plurality of nanostructures formed on the
2 thermal management device and the heat source comprise a plurality of nanostructures
3 disposed in predetermined manner to facilitate coupling of the plurality of
4 nanostructures formed on the thermal management device with the plurality of
5 nanostructures formed on the heat source.

1 11. The apparatus of claim 9, wherein the plurality of nanostructures formed on the
2 thermal management device and the plurality of nanostructures formed on the heat
3 source have a plurality of molecules covalently coupling the nanostructures formed on
4 the thermal management device and the plurality of nanostructures formed on the heat
5 source.

1 12. The apparatus of claim 11, wherein the plurality of molecules comprises a flexible
2 polymer molecule.

1 13. The apparatus of claim 12, wherein the flexible polymer comprises
2 deoxyribonucleic acid (DNA) molecules.

1 14. The apparatus of claim 1, wherein the plurality of nanostructures comprises a
2 plurality of carbon nanotubes.

1 15. A system comprising:
2 a wiring board;
3 a memory device electrically coupled to the wiring board;
4 a heat source electrically coupled to the wiring board;
5 a thermal management device coupled to the heat source; and
6 an interface disposed between the thermal management device and the heat
7 source, the interface having a plurality of nanostructures.

1 16. The system of claim 14, wherein the wiring board comprises a printed circuit
2 board.

1 17. The system of claim 15, wherein the memory device comprises a flash type
2 memory device.

- 1 18. The system of claim 15 wherein the thermal management device comprises a
2 passive cooling device.
- 1 19. The system of claim 18, wherein the passive cooling device comprises at least
2 one of a heat sink, a heat spreader, heat pipes, and a heat slug.
- 1 20. The system of claim 15, wherein the thermal management device comprises an
2 active cooling device.
- 1 21. The system of claim 20, wherein the active cooling device comprises at least one
2 of an air jet impingement device and a dielectric liquid device.
- 1 22. The system of claim 15, wherein the heat source comprises an integrated circuit
2 (IC) die.
- 1 23. The system of claim 15, wherein the interface comprises a plurality of
2 nanostructures formed on the thermal management device.
- 1 24. The system of claim 15, wherein the interface comprises a plurality of
2 nanostructures formed on the heat source.
- 1 25. The system of claim 15, wherein the interface comprises a plurality of
2 nanostructures formed on the thermal management device and the heat source, the

3 plurality of nanostructures formed on the thermal management device being coupled to
4 the plurality of nanostructures formed on the heat source.

1 26. The system of claim 25, wherein the plurality of nanostructures formed on the
2 thermal management device and the heat source comprise a plurality of nanostructures
3 disposed in a predetermined manner to facilitate coupling of the plurality of
4 nanostructures formed on the thermal management device with the plurality of
5 nanostructures formed on the heat source.

1 27. The system of claim 25, wherein the plurality of nanostructures formed on the
2 thermal management device and the plurality of nanostructures formed on the heat
3 source have a plurality of molecules covalently coupling the nanostructures formed on
4 the thermal management device and the plurality of nanostructures formed on the heat
5 source.

1 28. The system of claim 27, wherein the plurality of molecules comprises a flexible
2 polymer.

1 29. The system of claim 28, wherein the flexible polymer comprises deoxyribonucleic
2 acid (DNA) molecules.

1 30. A semiconductor package comprising:
2 a thermal management device;

3 a heat source;
4 an interface disposed between the thermal management device and the heat
5 source, the interface having a plurality of nanostructures.

1 31. The semiconductor package of claim 30, wherein the thermal management
2 device comprises a passive cooling device.

1 32. The semiconductor package of claim 30, wherein the thermal management
2 device comprises an active cooling device.

1 33. The semiconductor device of claim 30, wherein the heat source comprises an
2 integrated circuit (IC) die.

1 34. The semiconductor device of claim 30, wherein the interface comprises a
2 plurality of nanostructures formed on the thermal management device.

1 35. The semiconductor device of claim 30, wherein the interface comprises a
2 plurality of nanostructures formed on the heat source.

1 36. The semiconductor device of claim 30, wherein the interface comprises a
2 plurality of nanostructures formed on the thermal management device and the heat
3 source, the plurality of nanostructures formed on the thermal management device being
4 coupled to the plurality of nanostructures formed on the heat source.

1 37. The semiconductor device of claim 34, wherein the plurality of nanostructures
2 formed on the thermal management device and the heat source comprise a plurality of
3 nanostructures disposed in a predetermined manner to facilitate coupling of the plurality
4 of nanostructures formed on the thermal management device with the plurality of
5 nanostructures formed on the heat source.